

University of Bahrain
 College of Information Technology
 Department of Computer Science
 Semester 2, 2014-2015
 ITCS102/ITCS104/ITCS112 (Computer Programming II)

TEST 1

Date: 25/3/2015

Time: 16:00 - 17:15

STUDENT NAME	KEY
STUDENT ID	
SECTION	
MAJOR	- CS - IS - CE - OTHER <i>(please circle your major)</i>

QUESTION #	MARKS		COMMENTS
1-PART A	5		
1-PART B	6		
1-PART C	9		
2-PART A	5		
2-PART B	9		
2-PART C	6		
TOTAL	40		

Question 1 [string Type]

PART A [5 Points]

Show the output of the following C++ program:

```
#include <iostream>
#include <string>
using namespace std;
int main( )
{
string A="today is my lucky day";
string B="my";
string C= B + "  birth" + A.substr(2,3);
cout<<A<< endl;
cout<<C<<endl;
int x= A.find("day");
cout<<x<<endl;
for ( int i=0; i<x ; i++)
    cout<< A.substr(i,i+1)<<endl;
return 0;
}
```

OUTPUT

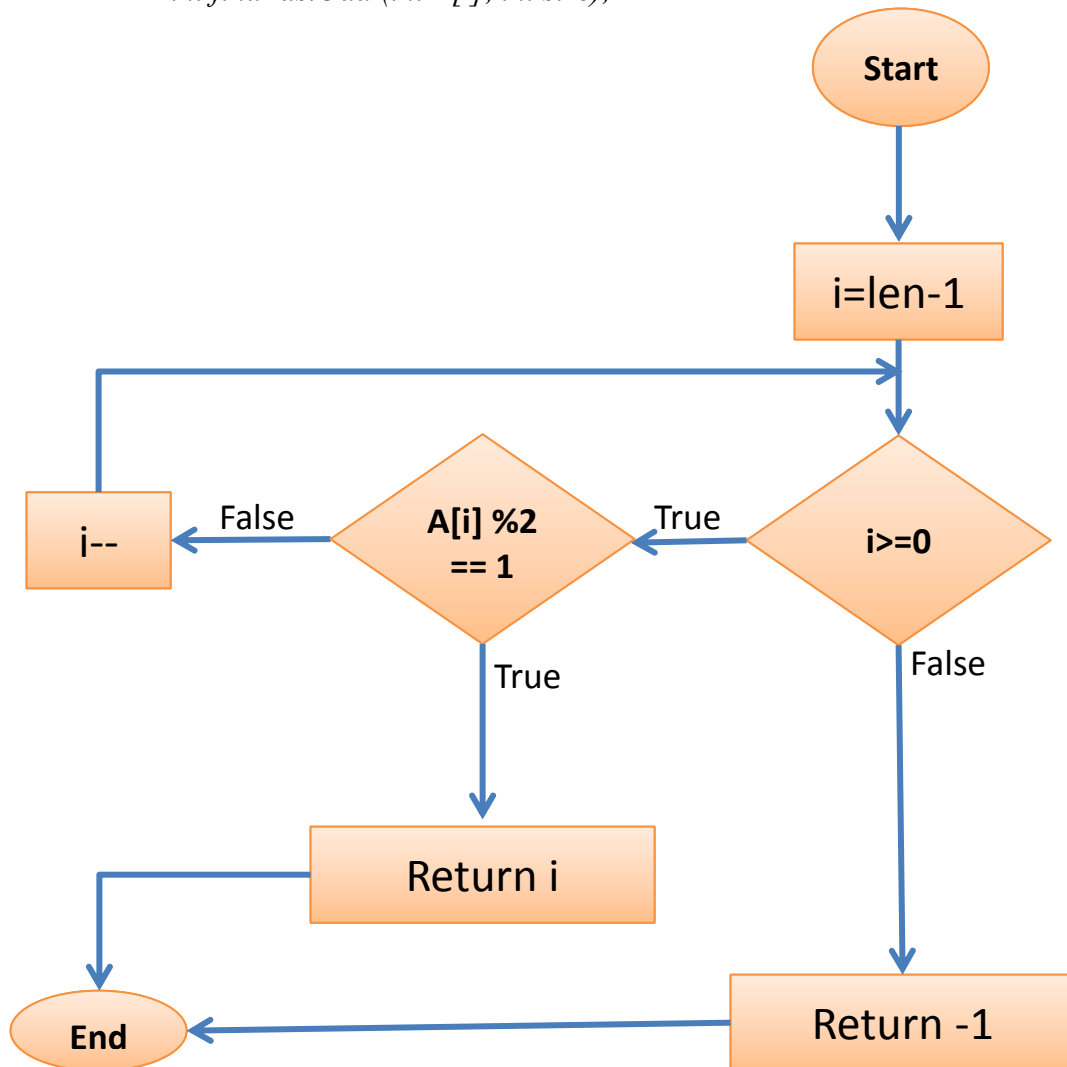
```
today is my lucky day
my birthday
2
t
od
```

Question 1 [Arrays]

PART B [6 Points]

Draw a flowchart to show the execution of a function named **findLastOdd** that takes as parameters: an array of integers (*A*), and the number of elements in the array (*size*). The function should return the index of the last odd number in the array. If there are no odd numbers, the function should return -1. The prototype of the function is:

int findLastOdd (int A[], int size);



Question 1 [Arrays]

PART C [9 Points]

Write a function named *removeFirstHalf* that takes as parameters: an array of integers (*arr*), and the number of elements in the array (*len*) passed by reference. The function should remove all elements in the first half of the array assuming that the length of the array is even.

The Function prototype: `void removeFirstHalf(int arr[], int &len);`

For example, If *len*=8, and the content of *arr* before calling the function is:

0	1	2	3	4	5	6	7
10	2	3	55	21	10	4	11

Then, after calling the function: *len*=4 and *arr* should be as follows:

0	1	2	3
21	10	4	11

```
void removeFirstHalf(int arr[], int &len)
{
    int size = len/2;

    for(int i=0; i<size; i++)
    {
        for(int j=0; j<len-1; j++)
            arr[j]=arr[j+1];
        len--;
    }
}
```

Question 2 [Struct]

PART A [5 Points]

Define a struct named `flag` to describe a flag of a given country. The flag data members are country name, colors (an array of maximum size of 5 to represent the main colors of the flag), and the number of colors.

```
struct flag
{
    string country;
    string color[5];
    int nColors;
};
```

PART B [9 Points]

Write a function named *commonColor* that accepts two flags. The function should calculate and return the number of common colors between the two flags. The function prototype is:

int commonColor(flag f1, flag f2);

```
int commonColor(flag f1, flag f2)
{
    int count = 0;

    for(int i=0; i<f1.nColors; i++)
        for(int j=0; j<f2.nColors; j++)
            if(f1.color[i]==f2.color[j])
                count++;

    return count;
}
```

Question 2 [Struct].. Continue

PART C [6 Points]

Write a main function to test the function *commonColor* defined in PART (B) to find the number of common colors between two flags. For each flag, the country name, colors, and the number of colors should be entered by the user, assuming that the user will enter a valid number of colors between 1-5. Then output an appropriate message for the user about the number of common colors.

```
int main()
{
// Declaration
// Reading
// Calling the function
// output

flag f1, f2;

cout<<"Enter first country name, number of colors: ";
cin>>f1.country>>f1.nColors;

for(int i=0; i<f1.nColors; i++)
{ cout<<"Enter color: ";
  cin>>f1.color[i];
}

cout<<"Enter first country name, number of colors: ";
cin>>f2.country>>f2.nColors;

for(int i=0; i<f2.nColors; i++)
{ cout<<"Enter color: ";
  cin>>f2.color[i];
}

int x = commonColor(f1, f2);

cout<<"The number of commom colors = "<< x << endl;

return 0;
}
```